REMARKS

Statusofthisapplication

Claims 1-20 are pending. In the Office Action mailed on July 5, 2006, claims 1-10, 12, 14-20 were rejected under 35 USC § 101 as being directed to non-statutory subject matter. Claims 1-9, 15-16 and 20 were rejected under 35 U.S.C. 102(b) as being anticipated by Petrov et al. U.S. Patent Application Publication No. 2002/0050988 (hereinafter "Petrov"). Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable in view of Petrov considered with Damron U.S. Patent Application Publication No. 2003/0154060 (hereinafter "Damron").

Claims 11 and 13 were objected to as being dependent on a rejected base claim, but were indicated to be allowable if rewritten in independent form.

This response amended claim 1 to expressly state that the image projected onto the deformable surface is "visible" and dependent claims 8, 9, 11, 13-15 and 20 were amended to contain proper antecedent references to the visible image recited in parent claim 1 as amended. Claim 18 was amended to expressly state the meaning of the abbreviation "DEM."

Reconsideration of the rejections advanced in the outstanding action is requested in view of the foregoing amendments and the remarks below.

The non-statutory subject matter rejection

The Examiner suggest that the method and apparatus recited in claims 1-10, 12, 14-20 do not produce a real life, real world, useful, concrete, and tangible result. Reconsideration is requested.

There is no basis in fact for the Examiner's suggestion that applicants' invention does not provide useful results in the "real world." As explained in the following excerpts from the introduction to applicants' specification:

> *[0018] The invention may be used to advantage in a variety of applications. As described in detail below, the invention may be used to particular advantage in architectural and landscape design by employing selected, available simulation techniques to evaluate physical characteristics of a modeled form (e.g. elevation, curvature, contours, shadow, water flows) to better understand the behavior of different structures and terrains under different conditions.*

[0019] This invention offers an intuitive alternative for modeling and analyzing three-dimensional objects and forms, such as architectural and landscape models, where a mesh surface is automatically generated in real time according to the changing geometries of physical surfaces and used to update computational simulations. This approach allows users to quickly create and understand highly complex topographies that would be time consuming and require an inappropriate degree of precision if produced using mice and keyboards in conventional CAD tools.

* * *

[0022] The physical model creates and conveys spatial relationships that can be intuitively and directly manipulated by the user's hands. This approach allows users to quickly define and understand highly complex topographies that would be time consuming and require an inappropriate degree of precision if produced using conventional CAD tools. This alternative vision makes better use of the user's instinctive abilities to discover solutions through the manipulation of physical objects and materials.

* * *

[0025] The preferred embodiment of the invention performs real-time computational analysis of landscape models. It is to be understood, however, that the techniques employed are more broadly applicable to a variety of uses which benefit from the availability of a human-computer interface that enables the user to define geometric forms by manipulating a deformable surface to change its shape, and to directly visualize computed result data that is projected in real time onto the surface of the deformable surface. In addition to landscape design, the interface can be used to advantage in medical imaging, free-form architectural construction, fluid dynamics modeling, and many other domains that require an understanding of special and temporal factors manifested in three dimensional space.

[0026] When applied to the problem of landscape design, the specific embodiment described below, which is called "Illuminating Clay," allows a landscape designer to modify the topography of a clay landscape model while the changing geometry of the model is captured in real-time by a ceiling-mounted laser scanner. The captured elevational data that describes the surface of the model serves as input data for use with a library of landscape analysis functions that can be executed by a connected processor in real time, with the results of the analysis being projected back onto and registered with the surface of the model.

From the foregoing, it is clear that applicants' invention as disclosed is plainly useful, is plainly "more than an idea or concept," and is plainly not "simply a starting point for future investigation or research." A review of the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility*, U.S.P.T.O. OG Notices: 22 November 2005, cited by the Examiner confirms that applicants' invention as disclosed and as claimed satisfies the requirements of 35 U.S.C. §101. Reconsideration of the rejection of the claims as being directed to non-statutory subject matter is accordingly requested.

The rejection under 35 USC §102 based on Petrov

Claims 1-9, 15-16 and 20 were rejected under 35 U.S.C. §102(b) as being anticipated by Petrov.

Claim 1 includes limitations that expressly distinguish applicants' invention from Petrov's method for capturing 3D surfaces.

Claim 1 requires the presence of "a deformable material that may be manually shaped to define a surface." A review of the Petrov disclosure has revealed no disclosed use of deformable materials. Paragraph 0009 of Petrov cited by the Examiner does not suggest the use of deformable materials.

Claim 1 has been amended by this response to clarify the fact that the image which projected onto the deformable surface is a "visible" image (rather than calculations which mathematically project shape data onto a mathematically defined surface). Claim 1 as amended further requires the presence of "means for projecting a visible image corresponding to said result data onto said surface" (formed by the manually shaped deformable material). Because Petrov does not employ a deformable material to create a manually shaped surface, there is no such surface upon which to project an image of any kind. Paragraph 0024 cited by the Examiner notes that silhouette image polygons are "projected" to create a model of the 3D object, but this does not involve the "projection of a visible image onto a surface" as now claimed but rather the calculation of 3D shapes from a set of 2D silhouette shapes which uses mathematical projections but not the projection of visible images onto surfaces.

Independent claim 1, and each of its dependent claims 2-20, are believed to clearly define subject matter which is neither disclosed nor suggested by Petrov and are hence allowable as now presented over Petrov.

Dependent Claim 2 states that the deformable material is supported on a rotatable turntable. As the Examiner points out, Petrov supports a 3D object whose shape is captured on a rotatable turntable seen at 6 in Fig. 1. The object supported is not, however, "deformable."

Dependent Claim 3 requires that the deformable material is selected from a group consisting of clay, putty, plasticine, beads, and rectilinear blocks. Claim 4 requires that the deformable material is a plastic that can be shaped and, once shaped, retains its shape. The

Examiner cites paragraph 0024 of Petrov but that paragraphs does not suggest that the 3D model from which silhouette images are captured is deformable or that it is composed of any of the materials listed in claims 3 or 4.

Dependent Claims 5-7 are dependent upon claim 1 and are patentable for the reasons presented above regarding claim 1.

Dependent Claim 8 is dependent on claim 6 and further requires that the visible image projector is located at the same location of corresponding to the result data is located at the same optical origin as said laser scanner. **Dependent Claim 9** further states that this is accomplished using an optical mirror. The Examiner cites Fig. 1, but that drawing shows a camera 2 that captures a silhouette image of an object 4 against a background screen 16. Petrov suggests that laser scanning can be used to capture the surface configuration of the object, but there is no suggestion of anything that projects a visual image onto the object surface. Hence, there is no projector to locate at the same optical origin as a laser scanner as set forth in claim 8, and Petrov doesn't describe using mirror for any purpose.

Dependent claim 15 further requires the use of "means for representing said result data in a standard graphical display format and for thereafter processing said result data in said standard graphical display format into image data supplied to said means for projecting a visible image corresponding to said result data onto said surface." The Examiner cites Fig. 1 which shows a computer, but there is no projector connected to the computer which might receive image data in a standard graphical display format, or any other format, to project onto any surface.

Claims 16 states that the system processes geometric data consisting of an array of values each of which represents the elevation on a two-dimensional surface. The cited passage in Petrov at paragraph 0282 discloses nothing of the kind.

Claim 20 further requires "storing said result data as a voxel dataset representing the characteristics of said surface and a three dimensional region surrounding said surface, means for measuring the position of a second surface, and means for projecting a visible image corresponding to a selected portion of said voxel dataset defined by the position of said second surface relative to said first surface." The Examiner cites Figures 19c-d which are flowcharts that describe, among other things, how pixel bitmaps are used to control "clusterization" and

"small cluster removal" during the process of converting silhouette data into a 3D model. But that disclosed process has nothing to do with process performed by the apparatus defined by claim 20: Petrov's system does not compare the measured position of a projection surface with positions represented by bitmap (voxel) data, and does not project any portion of the bitmap data as a visible image onto any surface.

It is accordingly submitted that claim 1 and its dependent claims 2-20 are fully distinguishable from the system taught by Petrov and the anticipation rejection should be withdrawn.

The rejection of claims 17-19 based on Petrov and Damron

Claims 17-19 were rejected under 35 U.S.C. 103(a) as being unpatentable in view of Petrov and Damron.

Claims 17-19 state that the system processes geometric data consisting of an array of values each of which represents the elevation on a two-dimensional surface, and that such data is represented in standard DEM format, a standard digital representation of topography used by the U.S. Geological Survey.

For the reasons expressed above with regard to parent claims 1 and 16, Petrov does not disclose generating or projecting visible images, and does not suggest processing geometric data consisting of an array of values each of which represents the elevation on a two-dimensional surface. Hence, one skilled in the art would have no reason to use topographical DEM data in the Petrov system.

The cited Damron system is used to merge terrain elevation data having different formats from different sources. One skilled in the art would have no reason to modify Petrov's system to somehow incorporate Damron's system. The Examiner cites Damron at 0039 and suggests that "it would've been obvious to one of ordinary skill in the art at the time of the invention to modify the Petrov * * * in order to access improved hydrologic and hydraulic analysis for plain mapping where DEM data are required." But Petrov clearly has no need to perform hydrolic or hydraulic analysis for plain mapping nor does Petrov have any need to merge DEM terrain map data. Nothing in either reference suggests the proposed combination.

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Allowable Subject Matter

The allowability of **dependent claims 11 and 13** is noted. Because the parent claims 10 and 12 are also allowable for the reasons presented above, claims 11 and 13 have not been rewritten in independent form by this response.

Conclusion

Claims 1-20 as now presented are directed to statutory subject matter that complies with 35 U.S.C. §101, fully distinguish over the cited Petrov patent and are hence satisfy the requirements of 35 U.S.C. §102, and define non-obvious subject matter that satisfying the requirements of 35 U.S.C. §103.

This application is believed to be in condition for allowance.

Respectfully submitted,

Dated: October 5, 2006 Charles G. Call, Reg. 20,406

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Dated: October 5, 2006 Signature _____

Charles G. Call, Reg. No. 20,406
USPTO Customer No. 021253
68 Horse Pond Road
West Yarmouth, MA 02673
Ph. (508) 778-2630 Fax (508) 629-6540
call@patentsoft.com

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